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09/862,452	05/23/2001	Tomoo Yamamoto	29273/550	8895

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EXAMINER	
UHLIR, NIKOLAS J	
ART UNIT	**PAPER NUMBER**
1773	

DATE MAILED: 11/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/862,452	YAMAMOTO ET AL.	
	Examiner	Art Unit	
	Nikolas J. Uhlir	1773	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 September 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) *11* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10 and 12-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 7 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

1. This office action is in response to the amendment/arguments dated 9/23/03. Applicant's amendment to the independent claims to require a non-magnetic glass substrate renders the prior rejections untenable. Accordingly, these rejections are withdrawn. However, the case is not in condition for allowance in lieu of the newly cited art discussed below.

Claim Rejections - 35 USC § 102

> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-2 and 4 are rejected under 35 U.S.C. 102(e) as being anticipated by Wong (US6558811).

3. Regarding the limitations of claim 1-2 and 4, Wong teaches a magnetic recording medium comprising a substrate, a seedlayer on the substrate, one or more underlayers on the seedlayer, one or more magnetic layers on the underlayer(s), a protective layer on the magnetic layer, and a lubricant layer. In specific embodiments, Wong teaches a recording medium having a ubstrate, a TiAl:N seedlayer on the substrate, a $CrMo_{20}$ underlayer on the seedlayer, and a CoCrPtTa magnetic layer on the underlayer (see figure 2a). Further, in a separate embodiment, Wong teaches a Ti_3Al:N seedlayer on the substrate, a Cr first underlayer on the seedlayer, a $CrMo_{20}$ second underlayer on the first, a CoCrPtTa first magnetic layer on the second underlayer, and a CoCrPt second magnetic layer on the first magnetic layer. The substrate can be either nickel

phosphorous or a ceramic glass (See column 1, lines 45-60 and figures 1-3c). Although no specific embodiment is taught wherein a glass substrate is utilized, given that the Wong limits the material choices for the substrate to either glass or nickel phosphorous, it is reasonable to infer that Wong anticipated forming the magnetic recording media shown by figures 2 and 3a on a glass substrate. Thus, all of the limitations of the instant claims 1-2 and 4 are anticipated by Wong.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claim 3 rejected under 35 U.S.C. 103(a) as being unpatentable over Wong as applied to claim 1 above, and further in view of Suenaga (5131995).

6. Wong as set forth above for claim 1 fails to teach the use of a TiAl alloy containing between 35-65 atomic % Ti and 35-65% Al, as required by claim 3.

7. However, Suenaga teaches that TiAl coatings for magnetic recording media substrates must have a hardness of at least 250 Hv to be viable (column 5, lines 42-53). In specific examples, Suenaga teaches that TiAl has an Hv of 200, Ti_3Al has a hardness of 250Hv, and Al_3Ti has a hardness value of 260Hv (column 4 table 1). It is clear from these examples that the composition of the titanium aluminum alloy has an impact on the hardness of the alloy, with hardness increasing as the concentration of aluminum or titanium in the alloy increases.

8. Therefore the examiner takes the position that the composition of the titanium aluminum alloy utilized as the seedlayer in Wong is a results effective variable. It would

have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the concentration of Ti and Al in the alloy within the range of 3:1 Ti:Al to 1:3 Ti:Al in order to obtain a TiAl alloy having a desired level of hardness.

9. Claims 5-8, 12, and 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wong as applied to claims 1-2 and 4 above, and further in view of Betero et al. (US6150015).

10. Wong as set forth above for claims 1-2 and 4 fails to teach all of the requirements of claims 5-8, 12, and 14-15, specifically the magnetic layer composition required by claim 5; the CoCr based intermediate layer required by claim 6; the magnetic layer crystal structure and orientation required by claims 7, 12, and 14-15; and magnetic recording apparatus required by claim 8.

11. For the purpose of clarity, the examiner notes once again that Wong teaches an example recording medium comprising a substrate/TiAl:N seedlayer/CrMo underlayer/CoCrPtTa magnetic layer, as shown by figure 2A.

12. Bearing the above embodiment of Wong in mind, Bertero teaches that the lattice matching between a Cr or Cr alloy underlayer and a HCP Co based magnetic layer can be improved by inserting a CoCr based nucleation layer between the underlayer and the magnetic layer, thereby improving the lattice matching between the underlayer and the magnetic layer (column 12, lines 36-65). The structure of the nucleation layer and the improved lattice matching allows the magnetic layer to have its c-axis oriented in plane (column 13, lines 30-35). Bertero teaches that this process is suited to mediums utilizing a CoCrPtTa alloy magnetic layer, and teaches that when such a magnetic layer is

utilized, the nucleation layer can be made without the Pt to conserve cost. In a specific example, Bertero forms utilizes a $CoCr_{15}Ta_4$ nucleation layer above a Cr seedlayer, and underneath a $CoCr_{15}Ta_4Pt_3$ magnetic layer (column 13, lines 30-45). The magnetic layer and the nucleation layer exhibit a difference in lattice constant that is <0.5%, and thus the crystallinity of the magnetic layer is improved.

13. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to form a $CoCr_{15}Ta_4$ layer as taught by Bertero between the CrMo underlayer and CoCrPtTa magnetic layer taught by Wong.

14. One would have been motivated to make this modification in lieu of the teaching in Bertero that the use of CoCrTa nucleation layer between a Cr or Cr alloy underlayer and a CoCrPtTa magnetic layer improves the crystallinity of the magnetic layer and allows the magnetic layer to exhibit good in-plane c-axis orientation.

15. Further, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the $CoCr_{15}Ta_4Pt_3$ magnetic layer taught by Bertero as the CoCrPtTa magnetic layer utilized by Wong as modified by Bertero *supra* at section 12.

16. One would have been motivated to make this modificiation in lieu of the teaching in Bertero that by specifically utilizing a $CoCr_{15}Ta_4Pt_3$ magnetic layer above a $CoCr_{15}Ta_4$ nucleation layer, the difference in lattice constant between the magnetic layer and nucleation layer is reduced to <0.5%, which results in the magnetic layer exhibiting improved crystallinity.

17. When the $CoCr_{15}Ta_4$ nucleation layer and $CoCr_{15}Ta_4Pt_3$ magnetic layer of Bertero are utilized in Wong, all of the limitations of claims 5-6 are clearly met. With respect to the crystal structure of the magnetic layer, Bertero teaches that Co based alloys containing Cr and additive elements have a HCP structure (column 3, lines 14-27). Regarding the magnetic layer orientation, Bertero teaches that CoCrPtTa alloys grown over a CoCrTa nucleation layer are oriented with the C-axis in plane with the substrate (column 18, lines 24-44). The combination of Wong with Bertero results in a medium that is grown on the same type of substrate (nonmagnetic), the same type of seedlayer (TiAl), the same types of underlayers (multiple Cr based), with the same type of magnetic alloy (CoCrPtTa) as that disclosed by the applicant in both the specification and the claims. Further, the layers are grown via the same method (epitaxial deposition via sputtering) as that disclosed by the applicant in the instant specification. Thus, in light of these similarities, the examiner takes the position that the limitations of claims 7, and 12 and 14-15 are met.

18. Regarding the recording apparatus limitations of claim 8, Bertero teaches a magnetic recording/reproducing apparatus that incorporates a magnetoresistive head that is suitable for recording and reproducing information from a medium utilizing a CoCrPtTa magnetic layer, as shown at column 21, lines 44-54. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the apparatus taught by Bertero with the recording medium taught by Wong as modified by Bertero, in lieu of the teaching in Bertero that such an apparatus is suitable

for recording/reproducing data from magnetic recording media utilizing a CoCrPtTa magnetic layer.

19. Claims 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wong as modified by Bertero as applied to claim 9 above, and further in view of Rubin et al. (US6421195).

20. Wong as modified by Bertero fails to teach the type of magnetoresistive head required by claims 9 (spin valve) and 10 (tunnel junction).

21. However, Rubin teaches that suitable heads for longitudinal magnetic recording include spin valves, magnetoresistive heads, tunnel junctions (equivalent to applicants claimed tunnel effect type head), or inductive read heads (column 5, lines 10-31).

22. Therefore it would have been obvious to one of ordinary skill in the art to utilize a spin valve or tunnel effect type sensor as taught by Rubin as the magnetic head utilized in Wong as modified by Bertero, as these head structures are recognized as equivalent for use in recording and reproducing on longitudinal magnetic recording media.

23. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wong as modified by Suenaga as applied to claim 3 above, and further in view of Bertero.

24. Wong as modified by Suenaga as set forth above for claim 3 fails to teach the crystal structure and orientation of the magnetic layer required by claim 13.

25. However, Bertero teaches that the lattice matching between a Cr or Cr alloy underlayer and a HCP Co based magnetic layer can be improved by inserting a CoCr based nucleation layer between the underlayer and the magnetic layer, thereby improving the lattice matching between the underlayer and the magnetic layer (column

12, lines 36-65). The structure of the nucleation layer and the improved lattice matching allows the magnetic layer to have its c-axis oriented in plane (column 13, lines 30-35). Bertero teaches that this process is suited to mediums utilizing a CoCrPtTa alloy magnetic layer, and teaches that when such a magnetic layer is utilized, the nucleation layer can be made without the Pt to conserve cost. In a specific example, Bertero forms utilizes a $CoCr_{15}Ta_4$ nucleation layer above a Cr seedlayer, and underneath a $CoCr_{15}Ta_4Pt_3$ magnetic layer (column 13, lines 30-45). The magnetic layer and the nucleation layer exhibit a difference in lattice constant that is <0.5%, and thus the crystallinity of the magnetic layer is improved.

26. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to form a $CoCr_{15}Ta_4$ layer as taught by Bertero between the CrMo underlayer and CoCrPtTa magnetic layer taught by Wong as modified by Suenaga.

27. One would have been motivated to make this modification in lieu of the teaching in Bertero that the use of CoCrTa nucleation layer between a Cr or Cr alloy underlayer and a CoCrPtTa magnetic layer improves the crystallinity of the magnetic layer and allows the magnetic layer to exhibit good in-plane c-axis orientation.

28. Further, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the $CoCr_{15}Ta_4Pt_3$ magnetic layer taught by Bertero as the CoCrPtTa magnetic layer utilized by Wong as modified by Bertero and Suenaga *supra* at section 26 in lieu of the teaching in Bertero that by utilizing a $CoCr_{15}Ta_4Pt_3$ magnetic layer above a $CoCr_{15}Ta_4$ nucleation layer, the difference in lattice constant

between the magnetic layer and nucleation layer is reduced to <0.5%, which results in the magnetic layer exhibiting improved crystallinity.

29. When the $CoCr_{15}Ta_4$ nucleation layer and $CoCr_{15}Ta_4Pt_3$ magnetic layer of Bertero are utilized in Wong as modified by Suenaga, all of the limitations of claim 13 are met. Bertero teaches that Co based alloys containing Cr and additive elements have a HCP structure (column 3, lines 14-27). Regarding the magnetic layer orientation, Bertero teaches that CoCrPtTa alloys grown over a CoCrTa nucleation layer are oriented with the C-axis in plane with the substrate (column 18, lines 24-44). The combination of Wong as modified by Suenaga with Bertero results in a medium that is grown on the same type of substrate (nonmagnetic), the same type of seedlayer (TiAl), the same types of underlayers (multiple Cr based) with the same type of alloy (CoCrPtTa) as that disclosed by the applicant in both the specification and the claims. Further, the layers are grown via the same method (epitaxial deposition via sputtering) as that disclosed by the applicant in the instant specification. Thus, in light of these similarities, the examiner takes the position that the limitations of claim 13 are met.

Response to Arguments

30. Applicant's arguments filed 9/12/03 have been fully considered but they are not persuasive. In the instant case, all of the applicant's arguments are directed towards the fact that the previously cited prior art failed to teach the newly required glass substrate. As this new limitation is clearly addressed above by the new grounds of rejection, the applicant's arguments are effectively rendered moot.

Conclusion

31. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nikolas J. Uhlir whose telephone number is 703-305-0179. The examiner can normally be reached on Mon-Fri 7:30 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Thibodeau can be reached on 703-308-2367. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-0389.

NJU
10/31/03

Paul Thibodeau
Supervisory Patent Examiner
Technology Center 1700